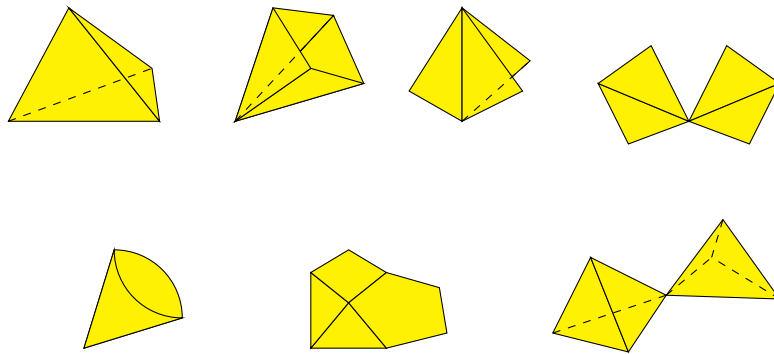# Simplicial surfaces in GAP

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3. August 2017

In this talk I will present the SimplicialSurface–package for GAP (joint work with Alice Niemeyer) that allows us to work with polygonal complexes (a generalisation of simplicial surfaces) like these:

They are represented by their incidence geometry (without a concrete embedding into some space). We can compute several properties of those complexes, some of them easy (orientability) and some of them harder (isomorphism testing).

Based on this general structure I will touch upon two of our research interests:

- We consider special edge colourings with three colours, like this:
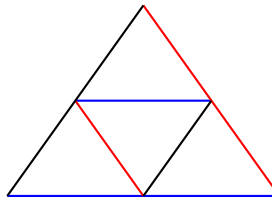
  With these edge colourings we can capture the structure of the simplicial surface by a set of involutions in a symmetric group. Then we can use group–theoretical means to analyse the surfaces.

- We are interested in the folding of paper. Since working with embedded surfaces is very hard (even for small examples), we have generalised the concept of folding to polygonal complexes. Here we are for example interested in the possible structures that can be achieved by folding a polygonal complex.